

SUBSTITUTE SPECIFICATION

CLEAN VERSION

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CLOSURE SYSTEM FOR TUBULAR ORGANS

Field of the invention

[0001] The present invention relates to surgical devices for adjusting the diameter of tubular organs such as the esophagus, the stomach, the colon or the urethra. 5 Such devices may be used as sphincters (e.g. as anal or urinary sphincters) or for the control of obesity. More particularly, the present invention relates to surgically implantable adjustable rings for encircling said tubular organs.

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Background of the Invention

[0002] Surgical devices for adjusting the diameter of tubular organs have been disclosed in the prior art, for example, in patent documents US 5,658,298, US 6,601,604, 15 FR 2 823 663, WO 01/85071 and WO 03/059215.

[0003] In particular, the device disclosed in International Publication No. WO 03/059215 has an open ring shape that comprises a first and second end parts and that is designed to be closed around a tubular organ 20 at the two end parts. A closure system adjusts the diameter of the tubular organ by forming the ring into a loop. The first end part of the ring is shaped like a sleeve and is designed to receive the second end part of

the ring, the main axis of the sleeve being defined along a direction that is substantially perpendicular to the main direction of the first end part. The second part of the ring comprises instead a hook-shaped extension that
5 is adapted to capture the edge of the second end part of the sleeve, and thereby to secure the ring in a closed position.

Summary of the invention

10 [0004] An object of the present invention is to provide a closure system improved over the devices in the prior art.

[0005] This and other objects of the present invention are achieved by providing a surgically implantable ring
15 that can be adjusted in diameter. In one embodiment, a surgically adjustable ring constructed according to the principles of the present invention comprises an open ring body that is designed to constrict a tubular organ and that includes a closure system having a first and a
20 second end parts. The first end part includes a sleeve that has a first and a second portion and that is designed to receive the second end part of the closure system. A locking protrusion extends from the second end part and is adapted to engage an aperture in the sleeve,
25 thereby securing the ring in a closed position.

Brief Description of the Drawings

[0006] The above and other objects and advantages of the present invention will be apparent upon consideration
30 of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference numerals refer to like parts throughout, and in which:

[0007] FIG. 1 is a perspective view of an embodiment of the invention in a closed position; and

[0008] FIG. 2 is a perspective view of the embodiment of FIG. 1 in an open position.

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Detailed Description of the Invention

[0009] An embodiment of the invention will be discussed in greater detail hereinafter.

[0010] Referring to FIGS. 1 and 2, adjustable ring 1
10 comprises a closure system having a first end part 3 and a second end part 4.

[0011] Ring 1 may be manufactured from any suitable material, for example, from a biocompatible elastomeric material. The external part of ring 1 may be more rigid
15 than the internal part, which has an internal diameter that is adjustable.

[0012] First end part 3 is shaped like a sleeve designed to receive second end part 4, while second end part 4 has an extension 11 containing adjusting means,
20 for instance, a wire which can be pulled or pushed in order to adjust the diameter of ring 1.

[0013] The sleeve on first end part 3 includes first end portion 6, which is reinforced by a flange 12, and second end portion 7, which contains aperture 5 designed
25 to receive and efficiently retain protrusion 2, and which is engages second end part 4.

[0014] For the purpose of closing or opening ring 1, second end portion 7 of the sleeve is provided with an extension defining flexible tab 9, which contains opening
30 10 situated close to aperture 5. The presence of opening 10 in tab 9 provides several advantages, in particular the accidental opening of the closure system is prevented in situations where tab 9 has to support forces, tending

to bend tab 9 in the direction of extension 11. Such forces may be due to the movement of the patient, or of the organs of the patient, or to the fluid or bolus passing through the tubular organ.

5 **[0015]** The area between aperture 5 and opening 10 is reinforced by flange 8. The other sides of opening 10 are also reinforced by flanges 13, 14.

[0016] The shape of protrusion 2 is designed to closely match the shape of flange 8.

10 **[0017]** The invention is of course not limited to the above described embodiment. In another embodiment, opening 10 may be replaced by a portion that is more flexible than the remaining part of tab 9. Such a more flexible portion may be obtained with different
15 techniques, for example, by making that portion thinner than the rest of tab 9. In still another embodiment, the second portion of the sleeve may partially overlap the second part of the closure system when the ring is in closed position.

20 **[0018]** The invention may be advantageously used in a variety of applications, for instance, as a sphincter or as a gastric ring.